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Parton cascades at DLA: the role of the evolution variable

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While experimental studies on jet quenching have achieved a large sophistication, the theoretical description of this phenomenon still misses some important points. One of them is the interplay of vacuum-like emissions, usually formulated in momentum space, with the medium induced ones that demand an interface with a space-time picture of the medium and thus must be formulated in position space. A unified description of both vacuum and medium-induced emissions is therefore lacking.
In this work, we build a toy Monte-Carlo parton shower ordered in formation time, virtual mass, and opening angle, representing equivalent formulations at leading logarithmic accuracy. Aiming at a link with jet substructure, we compute the Lund Plane distributions and trajectories for each ordering prescription. We also compute the distributions in number of splittings and final partons, with the goal of clarifying the differences in shower evolution to be expected from the different ordering variables. Further, we investigate the sensitivity of ordering prescriptions to medium effects by counting the number of events obeying a decoherence condition.

Category

Theory

Collaboration (if applicable)

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